

PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Best Available Copy

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 07 April 2000 (07.04.00)	
International application No. PCT/US99/18654	Applicant's or agent's file reference 54389PC6A003
International filing date (day/month/year) 17 August 1999 (17.08.99)	Priority date (day/month/year) 17 August 1998 (17.08.98)
Applicant TAKAKI, Shunsuke et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

11 February 2000 (11.02.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer S. Mafla
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 54389PC6A003	FOR FURTHER ACTION		see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US 99/ 18654	International filing date (day/month/year) 17/08/1999	(Earliest) Priority Date (day/month/year) 17/08/1998	
Applicant MINNESOTA MINING AND MANUFACTURING COMPANY et al.			

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

4

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☒ because this figure better characterizes the invention.

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 99/ 18654

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The abstract is changed as follows:

line 1: after "electrode" insert "(40)",

line 2: after "electrode support" insert "(41)",

line 3: after "surface" insert "(42)", after "opposed surface" insert "(43)",
after "conductor" insert "(44)",

line 4,5: after "layer" insert "(48)".

International Application No
PCT/US 99/18654

According to International Patent Classification (IPC) or to both national classification and IPC

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	✓ FR 2 509 182 A (ADVANCE KK) 14 January 1983 (1983-01-14) page 3, line 13 -page 6, line 8; figures 1-5	1,2,6,8, 15
A	✓ WO 95 20634 A (MINNESOTA MINING & MFG) 8 August 1995 (1995-08-03) cited in the application page 4, line 7 -page 11, line 5; figures 5-11	1-3,6,8, 9,14,15
A	✓ US 5 438 988 A (DUAN DANIEL C ET AL) 8 August 1995 (1995-08-08) cited in the application column 5, line 28 -column 14, line 4; figures	1,6,9, 14,15

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☒ Patent family members are listed in annex.

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of mailing of the international search report

23/11/1999

Authorized officer _____

Rakotondrajaona, C

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/18654

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A ✓	EP 0 138 347 A (ADVANCE KAIHATSU KENKYUSHO) 24 April 1985 (1985-04-24) page 18, line 28 -page 21, line 22 page 24, line 18 -page 27, line 4; figures 16-19 -----	1,2,6,8, 15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/18654

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2509182 A	14-01-1983	JP 1675180 C	26-06-1992
		JP 2017186 B	19-04-1990
		JP 58010066 A	20-01-1983
		CA 1196064 A	29-10-1985
		DE 3225748 A	21-04-1983
		GB 2104388 A,B	09-03-1983
		IT 1210902 B	29-09-1989
		US 4474570 A	02-10-1984
WO 9520634 A	03-08-1995	AU 1599595 A	15-08-1995
		CA 2179907 A	03-08-1995
		CN 1139946 A	08-01-1997
		DE 69509365 D	02-06-1999
		EP 0741765 A	13-11-1996
		JP 9509196 T	16-09-1997
		US 5670557 A	23-09-1997
		US 5674561 A	07-10-1997
		US 5779632 A	14-07-1998
		US 5853750 A	29-12-1998
		US 5952398 A	14-09-1999
US 5438988 A	08-08-1995	US 5276079 A	04-01-1994
		AT 146212 T	15-12-1996
		AU 657188 B	02-03-1995
		AU 3125493 A	15-06-1993
		CA 2116123 A	27-05-1993
		DE 69215893 D	23-01-1997
		DE 69215893 T	03-04-1997
		DK 612342 T	16-06-1997
		EP 0612342 A	31-08-1994
		JP 7501101 T	02-02-1995
		WO 9310201 A	27-05-1993
		US 5409966 A	25-04-1995
		US 5389376 A	14-02-1995
EP 0138347 A	24-04-1985	JP 60188176 A	25-09-1985
		JP 1717021 C	14-12-1992
		JP 4001634 B	13-01-1992
		JP 61031169 A	13-02-1986
		JP 1620191 C	30-09-1991
		JP 2045461 B	09-10-1990
		JP 60156475 A	16-08-1985
		AU 599493 B	19-07-1990
		AU 1850688 A	22-09-1988
		AU 575068 B	21-07-1988
		AU 3249284 A	07-03-1985
		CA 1262564 A	31-10-1989
		DE 3486412 D	14-12-1995
		DE 3486412 T	28-03-1996
		EP 0308572 A	29-03-1989
		US 4764164 A	16-08-1988

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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference E 1206 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/18654	International filing date (day/month/year) 17/08/1999	Priority date (day/month/year) 17/08/1998
International Patent Classification (IPC) or national classification and IPC A61N1/04		
Applicant MINNESOTA MINING AND MANUFACTURING COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 11/02/2000	Date of completion of this report 16.11.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Alvazzi Delfrate, S Telephone No. +49 89 2399 7450 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/18654

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:

Description, pages:

1-18 as originally filed

Claims, No.:

1-17 as received on 19/10/2000 with letter of 19/10/2000

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: . which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US99/18654

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-17
	No: Claims
Inventive step (IS)	Yes: Claims 1-17
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-17
	No: Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

The invention relates to a biomedical electrode having a conductive adhesive layer for attaching the electrode to an adherend.

Document FR-A-2 509 182 (=D1), which is regarded as closest prior art, relates to a iontophoresis device with a conducting layer of gel, which can adhere to the human skin.

Object of the invention is to provide a biomedical electrode comprising an adhesive with balanced properties of conductivity and adhesiveness.

To solve said technical problem an electrode as defined in claim 1 is provided.

The essence of the invention resides in an electrode comprising a conductive adhesive layer with a hot-pressed portion and a portion which is not hot-pressed.

Heat pressing can reduce the water content of the conductive adhesive and impair the adhesive's conductivity and if too great an area of the adhesive is heat-pressed, the adhesion of the electrode to the skin can cause pain when the electrode is removed from the skin; on the other hand it is necessary to provide the desired wear properties for the electrode.

The available prior art documents do not give hint toward an electrode as defined in claim 1, but define adhesive layers which are entirely hot-pressed.

Independent claim 1 therefore meets the requirements of Articles 33(2)-(4) PCT.

Claims 2 to 14 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Method claims 15 to 17 concern a method to manufacture the electrode of claim 1, therefore meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US99/18654

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
3. In the present case it would have been appropriate to draft the independent claim in the two-part form in accordance with Rule 6.3(b) PCT, with those features known in combination from the prior art (document **D1**) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).
4. It appears that the reference number of the document cited on p.1, l.16 is erroneous.

Re Item VIII

Certain observations on the international application

Claim 5 is not supported by the description as required by Article 6 PCT, as its scope is broader than justified by the description and drawings.

On p.5, l.16-27 of the description one of the embodiments of the invention has been described, in which a non-heat pressed portion of the conductive adhesive layer and a heat-pressed **perimetrical** portion (and not **any** portion, as claim 5 implicitly defines) are separated by an indentation.

Claims:

1. An electrode adapted for attachment to an adherend comprising:
 - (a) an electrode support having a first and a second opposed surface,
 - (b) a conductor supported by the electrode support, and
 - (c) a conductive adhesive layer comprising a hydrophilic phase and a hydrophobic phase that is disposed upon a major portion of the first, opposed surface of the electrode support and the conductor,wherein at least a portion of the conductive adhesive layer is hot-pressed to enhance the adhesion strength of the portion to an adherend.
2. An electrode according to claim 1, wherein the conductor is either in the form of a layer of conductive material disposed upon at least a portion of the first, opposed surface of the electrode support, or, the conductor is in the form a conductive stud that passes through a portion of the first, opposed surface of the electrode support and completely through the electrode support to project below the second, opposed surface of the electrode support.
3. An electrode according to any preceding claim, wherein the electrode further comprises a release liner disposed upon an exposed surface of the conductive adhesive layer.
4. The electrode according to any preceding claim, wherein the portion of the conductive adhesive layer that has been hot-pressed is a perimetrical portion.
5. The electrode according to any of the preceding claims, further comprising an indentation that separates the heat-pressed portion of the conductive adhesive layer from the remaining portion of the conductive adhesive layer.

6. An electrode according to any preceding claim, wherein the conductor is in the form of a layer of conductive material and the area of the conductor is essentially coextensive with the area of the electrode support.

5 7. An electrode according to any preceding claim, wherein the conductor comprises a conductive ink.

8. An electrode according to any preceding claim, wherein the conductive adhesive layer comprises: (a) a hydrophilic phase comprising hydrophilic polymer material, an electrolyte, and a humectant, and (b) a hydrophobic phase comprising hydrophobic polymer derived from the polymerization of hydrophobic monomer or oligomer in the presence of a surfactant and the hydrophilic phase.

10

9. An electrode according to claim 8, wherein the conductive adhesive layer consists essentially of: (a) a hydrophilic phase comprising hydrophilic polymer material, an electrolyte, and a humectant, and (b) a hydrophobic phase comprising hydrophobic polymer derived from the polymerization of hydrophobic monomer or oligomer in the presence of a surfactant and the hydrophilic phase.

15

10. An electrode according to any of claims 8 to 9, wherein the hydrophilic polymer material is selected from the group consisting of polymers containing one or more polyethylene glycol groups or polymers containing one or more pyrrolidone groups.

20

11. An electrode according to any of claims 8 to 10 wherein the electrolyte is selected from the group consisting of aqueous solutions of: potassium chloride, sodium chloride or lithium chloride.

25

12. An electrode according to any of claims 8 to 11, wherein the humectant is selected from the group consisting of propylene glycol or sodium DL-pyrrolidonecarboxylate.

30

13. An electrode according to any of claims 8 to 12, wherein the hydrophobic polymer comprises interpolymerized units derived from one or more of the following monomers: acrylic acid, isooctyl acrylate, 2-ethylhexyl acrylate and n-butyl acrylate.

5 14. An electrode according to any of the preceding claims wherein the adherend is mammalian skin.

10 15. A method of improving the adhesion strength of a conductive adhesive layer comprising a hydrophilic phase and a hydrophobic phase by hot-pressing a portion of the conductive adhesive layer.

16. The method according to claim 15, wherein the hot-pressed portion is a perimetrical portion.

15 17. The method according to any of claims 15 to 16, further comprising forming pinholes in the portion of the conductive adhesive layer to be hot-pressed prior to hot pressing.